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MINISTRY OF FORESTS

Merritt
Timber Supply Area

Rationale for
Allowable Annual Cut (AAC)
Determination

Effective January 1, 2002

Larry Pedersen
Chief Forester

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Objective of this document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Merritt Timber Supply Area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TSA

The Merritt TSA comprises approximately 1 130 000 hectares in south central British Columbia. The TSA is located in the southern section of the Kamloops Forest Region and is administered from the Merritt Forest District office in Merritt and a field office in Princeton. The Merritt TSA is bounded by the Kamloops TSA to the north and the Fraser and Lillooet TSAs to the west. The Okanagan TSA is situated to the east and south, while Manning Park, and the Canada-US border to the south. There are also several smaller provincial parks adjacent to, or within the TSA.

The Merritt TSA is comprised of the mountainous terrain and steep river valleys of the Cascade Mountains in the west and the relatively dry, flat Thompson plateau in the east. The TSA encompasses two major river systems: the Similkameen in the south and the Nicola in the north.

The TSA contains eight biogeoclimatic zones that reflect the various combinations of climate, vegetation and soils found in the TSA. The primary tree species is lodgepole pine, but forests are also comprised of Douglas-fir, Engelmann spruce, subalpine fir, ponderosa (yellow) pine and trembling aspen. Less common species include western redcedar, western hemlock and western larch.

Almost three-quarters of the TSA is considered productive Crown forest land (811 000 hectares). Currently 80 percent of the productive forest is considered available for harvest, representing 58 percent of the TSA land base.

Merritt and Princeton, accounting for over 60 percent of the total population, are the largest communities in the Merritt TSA. Other communities in the TSA include Tulameen, Brookmere, Missezula Lake, Douglas Lake, Lower Nicola, Osprey Lake and Allison Lake. The population of the entire TSA was 16,830 persons in 1996.

History of the AAC

In 1996, the chief forester determined an AAC for the Merritt TSA of 1 454 250 cubic metres. This amount maintained the AAC from the historically operated land base of the TSA (1 204 250 cubic metres), and added a smallwood pine partition of 250 000 cubic metres. In 1999, an uplift of 550 000 cubic metres per year was established for the salvage of timber damaged in the catastrophic 1998 Lawless wildfire and a mountain pine beetle epidemic. In 1999, the chief forester determined the AAC at 2 004 250 cubic metres. That level remains in effect today and is currently apportioned by the Minister of Forests as follows:

Apportionment	Cubic metres/year	Percentage
Forest Licences – replaceable (6)	1 025 694	51.2
Forest Licences – non-replaceable (6)	212 500	10.6
SBFEP - all category	180 738	9.0
Woodlot licenses	9 200[a]	0.5
Forest Service Reserve	576 118	28.7
Total	**2 004 250**	**100.0**

(a) The total amount apportioned to woodlot licences is 9200 cubic metres per year. However, records indicate that only 8700 cubic metres have been allocated to woodlots issued since the last AAC determination. Since woodlots and their AACs are administered separately from the TSA, the AACs issued to woodlot licences—in this case 8700 cubic metres— is deleted from the AAC attributable to the TSA.

New AAC determination

Effective January 1, 2002 the new AAC for the Merritt TSA will be 1 508 050 cubic metres.

This new determination maintains the pre-uplift AAC of 1 454 250 cubic metres and increases the small-diameter or smallwood pine partition by 62 500 cubic metres from the previous determination. The entire smallwood pine partition will now be set at 312 500 cubic metres per year. This volume excludes 8700 cubic metres per year of volume allocated to woodlot licences since the 1996 determination.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for the Merritt TSA include the following:

- *Merritt Timber Supply Area (TSA) Data Package and Information Report*, British Columbia Forest Service (BCFS), September 1999.
- Summary of changes to the *Merritt Timber Supply Area (TSA) Data Package,* November 1999.
- *Merritt Timber Supply Area Analysis Report* and *Merritt Timber Supply Area Public Discussion Paper*, BCFS, March 2001.
- *Merritt TSA Summary of Public Input on Data Package and TSA Analysis Report,* BCFS, May 2001 (draft).
- *Merritt TSA Inventory Audit*, BCFS Resources Inventory Branch, March 1998.
- *Merritt TSA Timber Supply Analysis,* BCFS, September 1994;

- *Merritt TSA Rationale for AAC determination,* BCFS, 1995.
- *Merritt TSA Rationale for AAC uplift determination,* BCFS, 1998.
- *Kamloops Regional Landscape Unit Planning Strategy*, Ministry of Forests, June 1999.
- *Forest Practices Code of British Columbia Act*, July 1995.
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, April 1995.
- *Report on Roads, Trails and Landing for Merritt TSA,* by Graeme Hope Regional Soil Scientist (March 1999).
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP.
- *Forest Practices Code Timber Supply Analysis*, BCFS and MELP, February 1996.
- *Working Paper 36/1998, Site Index Adjustments for Old-Growth Stands Based on Veteran Trees,* Nigh, G.D., BCFS Research Branch, 1998.
- *Working Paper 37/1998, Site Index Adjustments for Old-Growth Stands Based on Paired Plots*, Nussbaum, A.F., BCFS Research Branch, 1998.
- *Site Index Estimates by Site Series for Coniferous Tree Species in British Columbia* (SIBEC manual). Forest Renewal British Columbia and British Columbia Ministry of Forests. 1997.
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province.
- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources.
- *Management and Silviculture Opportunities for Interior Douglas-fir Stands in the Pothole Creek Demonstration Area,* April 1997.
- *Protocols for Managing Interior Dry-belt Douglas-fir, Revised Draft Report,* March 1999.
- Letter from the deputy ministers of Forests and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives for achieving acceptable impacts on timber supply from biodiversity management.
- *Merritt Small Wood Inventory Report*, IRM Consultation Services. Inc. January 1995.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis, due in part to variations in physical, biological and social conditions. Ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of the uncertainty in the analysis.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does however provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for the Merritt TSA, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units over extended periods, administrative fairness requires consistency when addressing these changes and associated uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it is necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation. Some factors can work to

increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance. Other factors can work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were originally approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although implementation of the Forest Practices Code has been underway since the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination, I consider this uncertainty to the extent possible in context of the best available information.

The eventual timber supply impacts associated with strategic land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy, and Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base (THLB) and are no longer considered contributing to the timber supply in AAC determinations.

Forest Renewal British Columbia (FRBC) funds a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider

information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for determinations that are more reliable.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information, considering any uncertainties. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely based on a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from court decisions including those in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting those obligations under these decisions. In this respect, it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Merritt TSA. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

With respect to future treaty decisions, as with other land-use decisions it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent decisions in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting the Crown's obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Merritt TSA. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

Overall, in making AAC determinations, I am mindful of my obligation as a steward of forest land of British Columbia, of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under the *Forest Practices Code of British Columbia Act*.

The role of the timber supply analysis

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TSA, a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (Forest Stand Simulator, or FSSIM), several timber supply forecasts are produced, reflecting different decline rates, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TSA is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made based on my informed judgement, using current available information about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgements that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber supply analysis for the Merritt TSA

The base case harvest forecast presented in the *March 2001 Merritt Timber Supply Area Analysis Report* incorporated the best available information on current forest management, land base and timber yields for the TSA. It included specific assumptions related to the implementation of the Forest Practices Code.

These assumptions are discussed in the timber supply analysis report. In this rationale, I will discuss many of those assumptions in the context of my considerations for this AAC determination. However, where I have reviewed an assumption, and concluded that it was

appropriately modelled in the base case of the timber supply analysis, I will not discuss my considerations in detail in this document.

In the timber supply analysis, 8700 cubic metres per year issued to woodlot licences since the 1996 determination were excluded from the AAC attributable to the TSA. Therefore, the initial harvest level in the base case harvest projection is 1 445 550 cubic metres per year. 8700 cubic metres per year less than the 1 454 250 cubic metres per year, which is the pre-uplift AAC (1996). Presently, the AAC is 2 004 250 cubic metres per year. This includes an uplift of 550 000 cubic metres per year to allow for salvage of timber from the 1998 Lawless Creek fire and to control the mountain pine beetle infestation.

A base case was generated that incorporated the factors described above and others appropriate to the TSA. This base case projected that the pre-uplift harvest level of 1 454 250 cubic metres per year could be maintained for six decades. The projected harvest level then declined over the subsequent three decades by approximately nine percent per decade, after which the long-term harvest level is 1 120 000 cubic metres per year is reached.

Specific considerations which led to the choice of the base case harvest forecast included establishing an initial harvest level at the current AAC, and providing for an orderly transition from harvesting existing natural stands to future managed stands. In addition, a slightly greater volume of wood is available over the analysis horizon in the chosen base case harvest forecast than in the other alternatives. I have considered the reasoning used to select the base case and am satisfied that it provides a suitable basis from which to evaluate the assumptions regarding land base, management practices and timber yields. Therefore, I am satisfied that the BCFS base case harvest forecast provides a suitable reference point from which to assess available timber supply in the TSA. I have also considered all public input received on the data package and analysis report, and where appropriate I have discussed my considerations under the various factors presented in this rationale.

In July of 1997, the major licensees together with First Nations and the Small Business Forest Enterprise Program submitted an application for an Innovative Forestry Practice Agreement (IFPA) in the Merritt TSA under section 59.1 of the *Forest Act*. To co-ordinate this application and to develop an innovative management approach for the area, the participants formed the Nicola-Similkameen Innovative Forestry Society. The legislation allows IFPA holders to request an AAC increase to their forest licences that are linked to the IFPA. The regional manager may, if justified through a timber supply analysis and other considerations, increase licence AACs. Under the *Forest Act*, AAC decisions for IFPAs are distinct from TSA AAC determinations made by me as part of the Timber Supply Review. Nevertheless, my determination and the decision underlying it will affect the regional manager's determination under the IFPA. Avoiding overlap or conflict between the two determinations, requires that my determination be clear and precise.

I am aware of several ongoing studies under the IFPA, and expect that the regional manager will consider the available results in his future determination respecting the IFPA.

In making my determination, I have considered all of the information presented. While the IFPA is not a consideration under Section 8 of the *Forest Act*, at several points in this rationale I have noted the need for improved information to assist in future determinations.

These information requirements may provide opportunities for study and innovative practices under the IFPA.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

As part of the process used to define the timber harvesting land base in the timber supply analysis, a series of deductions are made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for ecological, economic or social (e.g. parks) reasons. In timber supply analysis, assumptions, and if necessary, projections, must be made about these factors before quantifying appropriate amounts of areas to be deducted from the productive forest, in order to derive the timber harvesting land base. In the Merritt TSA, the deductions result in a timber harvesting land base of 660 326 hectares, or approximately 81 percent of the Crown productive forest land.

I have considered all of the deductions applied in the derivation of the timber harvesting land base.

Factors associated with the derivation of the timber harvesting land base for which, based on my review, I accept the assumptions as modelled in the analysis are: operability, problem forest types, existing and future roads, trails landings and woodlots. In general, I have not discussed these factors in detail in this rationale. Although I have accepted the operability information for use in this determination, I have noted some uncertainties related to isolation of timber and to harvesting in relation to the operability classification (that is, both above and below the operability line). Therefore, I encourage continued development of terrain mapping, and monitoring of harvest operations in relation to the operability classification.

Where my consideration of the information has identified a factor for which an adjustment is required, or the factor otherwise in my estimation requires discussion in this document, it is described below.

- environmentally sensitive area

An environmentally sensitive area (ESA) is an area where non-timber values or potential management-related hazards may preclude or limit timber harvesting. ESAs are associated with fragile or unstable soils, impediments to regeneration, high risk of avalanches, wildlife habitat and watershed values. The forest inventory identifies both highly sensitive (ESA1) and moderately sensitive (ESA2) areas. In the Merritt TSA analysis, ESA1s were fully

excluded from the timber harvesting land base and ESA2s were fully included. A total of 34 531 hectares were excluded from the THLB because of classification as ESA1.

I acknowledge that the treatment of ESAs varies somewhat across the province. The most common analysis approach is to exclude a large proportion of ESA1s (generally in the range of 80-100%), to account for their high sensitivity, and a smaller proportion of ESA2s (generally in the range of 30-50%). District staff acknowledge that limited operations occur on ESA1s and that the majority of the values and hazards in ESA2s can be addressed during operations without a significant effect on the size of the timber harvesting land base. I am aware that only about half (27 817 hectares) of the total ESA2 area remains in the timber harvesting land base after all exclusions, and a substantial portion of the remaining areas are constrained by forest cover requirements. Given this level of *de facto* exclusion, it is reasonable to expect that the values and risks associated with ESA2s can be accounted for by appropriate management action through either exclusion or modification of harvesting.

In conclusion, while management of ESA2s represents a source of uncertainty, I am satisfied that associated values and risks can be managed, and that no adjustments are required. Nevertheless, management in ESA2s should be monitored during the term of this determination to ensure that staff can confirm appropriate accounting of these areas in future timber supply analyses.

- *smallwood pine*

The 1995 AAC determination identified an opportunity to manage smallwood lodgepole pine stands previously categorized as a problem forest type for timber supply. In the 1995 AAC determination, 250 000 cubic metres per year were partitioned for harvesting in smallwood pine stands as described in the *Merritt Small Wood Inventory Report* (1995) and identified in the *Merritt TSA Timber Supply Analysis* (1994). For licence administration in the Merritt TSA, these pine stands are defined as having a site index less than 14 meters at reference age 50 years, and as being less than height class 3 (19.5 metres).

In preparation for this determination, district staff conducted a review of smallwood pine forest types and estimated that they cover 93 500 hectares of the timber harvesting land base.

Harvesting records and a review of operations indicate that smallwood pine harvesting during 1998-2000 has approximated licence commitments. While I have been informed that some licensees are having business difficulties, it appears that in general the smallwood pine profile is being utilized according to the existing partition. Some harvesting under smallwood pine licences has been directed to the control and salvage of mountain pine beetle damaged wood in smallwood pine stands.

The timber quality and observed productivity in smallwood pine stands is believed to have resulted from initially dense stocking after fires. Therefore, after these stands are harvested and reforested using current stocking standards, they are expected to be more productive, and to contribute in the future to the conventional sawlog harvest.

District staff have observed that many stands that are classified as smallwood pine in the inventory do not qualify for smallwood pine cutting permits because the wood is either too

large (i.e. is actually of sawlog size) or is too small to harvest and process economically. District staff note that the site index 14 threshold used to define smallwood stands creates administrative difficulties due to lack of flexibility. As in any management unit in the province, the inventory information used for the Merritt TSA timber supply analysis was assessed and interpreted in order to reflect current management practices in the analysis rather than to dictate practices. Therefore, I will leave it to district staff to determine if access to the smallwood pine profile would be better facilitated by a change in the definition of smallwood pine stands, and I also leave it to their discretion to determine how best to administer the smallwood pine land base in a manner consistent with the intent of the partition.

Given the current utilization and proven demand for the smallwood, the distinctive nature of these stands, and confidence that the productivity of future managed stands on these sites will be higher than currently indicated by the small trees, I will maintain a partition for small wood harvesting.

I will discuss my considerations of this factor further under 'Reasons for decision'.
I request that staff continue to monitor and track smallwood operations and trends in these stands.

- Douglas-fir selection harvesting

Douglas-fir stands in which selection harvest systems are employed, cover approximately 101 000 hectares, or nearly 15 percent, of the timber harvesting land base. These stands present many forest management challenges. Many have a history of partial harvesting or partial disturbance. They have highly variable volumes, are prone to several forest health issues and have high non-timber values. Variation between actual conditions and forest inventory labels is greater for selection Douglas-fir than most other stand types. Therefore, developing criteria for determining whether a specific Douglas-fir stand should be in the timber harvesting land base is difficult.

In the base case, the average area of fir stands harvested over the next 50 years is projected to be approximately 600 hectares per year. However, district staff advise that harvesting over the last 5 years has averaged only around 180 hectares per year. Although more Douglas-fir selection harvesting is included in development plans over the next 5-year period, district staff believe that this higher level may not be achieved due primarily to other harvesting priorities related to mountain pine beetle control. Input from both district staff and the forest industry indicated that the merchantability thresholds for Douglas-fir selection harvesting, and future utilization of this species are subject to uncertainty

The timber supply analysis report suggests that selection fir provides less than 5 percent of the long-term timber supply. Analysis performed subsequent to release of the report indicates that complete exclusion of selection fir stands from the timber harvesting land base would reduce medium-term timber supply (i.e., over the next 100 years) by 3.4% relative to the base case. The pre-uplift AAC could still be achieved for 50 years. Other results show that if harvests continued at approximately the current performance level (about 200 hectares harvested annually), long-term timber supply would decrease by 0.5 percent compared to the base case. The results suggest that short-term timber supply does not depend on these stands, meaning that time is available to continue to examine

management options for these stands, and to evaluate their potential contribution to timber supply and other forest values in the TSA. I have been informed that, from a timber supply perspective, many of these stands are not currently in a highly productive condition, which may provide some restoration opportunities.

I encourage district staff to continue monitoring performance in selection management Douglas-fir stands, and monitoring results should form the basis for their level of contribution to timber supply in future determinations. I also encourage further investigation of management options and the potential for restoration of productivity in these stands.

- protected areas

In 1993, the provincial government released *A Protected Areas Strategy for British Columbia*, which describes the policies and process to protect 12 percent of the province. The strategy has two goals: representation (Goal 1) which protects viable examples of the natural diversity of the province, and special features (Goal 2) which protect the special natural, cultural heritage and recreational features of the province. Protected areas are designated areas of land and water set aside to protect natural and cultural heritage, or recreational values. In the base case, existing parks and ecological reserves, amounting to approximately 11 000 hectares or 1 percent of the total TSA, were excluded from the timber harvesting land base. While these areas are excluded from timber harvesting, forested portions can help to achieve forest cover objectives.

In addition to the established protected areas referenced above, there are a number of proposed protected areas in the Merritt TSA that cover about 31 600 hectares of the timber harvesting land base. In accordance with my guiding principles, until these areas are officially established by government, I will not speculate on the outcome of the land use designation. Hence, the proposed protected areas within the timber harvesting land base will contribute to timber supply for this determination.

A sensitivity analysis shows that if all proposed areas were deducted from the timber harvesting land base, projected timber supply would remain at base case levels for 50 years, and the long-term level would be 4 percent lower than the base case. Results of the sensitivity analysis suggest that not accounting for these proposed protected areas until official decisions are made will not place timber supply or other forest management objectives at risk. I am also aware that regional guidelines are in place for management of candidate protected areas, and trust that important values will be conserved pending final decisions.

Any new protected areas can be accounted for in future determinations when they become officially designated.

<u>Existing forest inventory</u>

The inventory data used for the timber supply analysis was based on a forest inventory completed between 1991-1996. For the analysis, the inventory file was updated to 1998-1999 to account for growth and disturbance through harvesting or fire. An audit conducted in 1998 found the inventory statistically acceptable. The audit indicated an

average volume underestimation of 6 percent in stands over 60 years of age; however, this difference was not statistically significant.

For the immature component of the inventory, that is, stands younger than 60 years, the audit indicated that site index derived using inventory height and age was significantly (more the 3 metres) lower than ground-measured site index for almost half the stands sampled. Inventory and ground-measured site indexes were within the allowable tolerance (plus or minus 3 metres) for slightly over half of the samples. These findings suggest that further review of the immature inventory component is required. However, the sample size for immature stands was small, and any inaccuracies would have long-term rather than short-term impacts. Therefore, some time is available to examine the issue further and to generate more accurate information if necessary. I note that the purpose of the audit with respect to immature stands was to assess the accuracy of inventory information, specifically age and height, with site index being used as an indicator of the combined accuracy of these two attributes. This examination was different in nature from the comparison of potential site productivity and the site index derived from attributes of existing old-growth, as discussed under *site productivity estimates*, below.

District staff note that in the Engelmann Spruce—Subalpine Fir moist warm (ESSF mw) biogeoclimatic subzone, amabalis fir is commonly mis-classified as spruce. This mis-classification would tend to overstate the quality of the wood and understate the amount decay. It is not known at this time if this issue has any overall timber supply implications, although district staff believe the impacts are negligible. Inventory work is required to provide better information to address this issue.

A further inventory issue involves volume estimates where only portions of forest cover polygons have been harvested. In these cases, the remaining timber may not be appropriately labelled. That is, the timber left may be of poorer quality or lower volume than the original label indicates.

While the issue of forest cover classification in some harvested polygons introduces some uncertainty, it has not been verified that the remaining volumes are sufficiently lower to have a timber supply impact. Therefore, at this time, I am satisfied that the best available inventory information was used in the analysis.

In conclusion, I acknowledge the uncertainties presented by the audit findings and district staff observations respecting species mis-labelling and potential volume overestimation in partly harvested stands. However, given the overall audit findings that volume estimates based on the inventory are statistically acceptable, and, in the case of site index estimates in immature stands, the long-term nature of any potential impacts, I am satisfied that the best available information was used and that there is time to collect more accurate information for future determinations without creating significant risk to timber supply. I will make no related adjustments in this determination. I request that Forest Service staff monitor harvesting to improve information on species composition and assess the importance of possible volume reductions in partly harvested stands.

Expected rate of growth

I have considered the information regarding the assumed minimum harvest ages, and the operational adjustment factors (OAF) applied to volume estimates to account for factors that reduce timber production, such as small gaps and decay waste and breakage. I am satisfied that the analysis assumptions were appropriate in this regard and I will not discuss my considerations in further detail in this rationale. However, as in many areas of the province, it would be beneficial to refine OAFs by collecting local data for future analysis.

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand. Site productivity is expressed in terms of a site index, which is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow, which in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced and the age at which a stand will reach a merchantable size.

In general, in British Columbia, site indices determined from younger stands (i.e. less than 31 years old) and older stands (i.e. over 150 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, the trees used to measure site productivity may have grown under intense competition since they were not subject to management of stocking density, or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—such as the old-growth site index (OGSI) 'paired plot' project and the 'veteran' study, suggest that actual site indices may be higher than those indicated by data from existing old-growth forests. Site index estimates for site series within the Biogeoclimatic Ecosystem Classification System (SIBEC) also consistently indicate that site productivity has generally been underestimated and that managed forest stands tend to grow faster than suggested by inventory-based site index estimates.

For the Merritt TSA, sensitivity analysis was used to assess how timber supply would change if site productivity were underestimated to the extent suggested by the OGSI studies. For the sensitivity analysis, the site indices of all stands older than 140 years of age were adjusted. For Douglas-fir, lodgepole pine and interior spruce, adjustments were based on paired plot data; for all other species, adjustments were based on veteran tree study. Stand volumes, minimum harvestable ages and green-up ages were adjusted to account for the increased site productivity in the sensitivity analysis. The sensitivity analysis results indicate that the decline to a long-term harvest level, 15% higher than in the base case, could be delayed until after 17 decades into the future.

District staff observations of regenerated smallwood pine sites indicate much better growth than suggested by the inventory site indices attributed to the existing stands, which were modelled in the timber supply analysis. Application of the zonal average site index values according to correlations between biogeoclimatic site series and site index from the SIBEC manual, rather than the inventory values increased the average site index from 11.7 to 16.4. Sensitivity analysis shows that this site index increase would increase long-term timber supply by 8% or 93 000 cubic metres per year above the base case. Since paired-plot and

veteran tree adjustments are applicable only to sites currently occupied by stands older than 140 years, and only about 2 percent of smallwood stands meet that criterion, this increase is largely in addition to that indicated in the sensitivity analysis that examined the impact of the paired plot and veteran adjustments.

While the trend towards increased site productivity is clear based on studies and field observations, the ultimate magnitude of productivity increase is uncertain since no regenerated stands have been tracked from harvest through maturity given the relatively limited harvesting history in the area. Establishment of permanent sample plots in these stands would provide the basis for more reliable future estimates.

Public input from the Shuswap Environmental Action Society (SEAS) urged the chief forester not to rely on adjusted site indices, because of the uncertainty of future conditions and biases in the data as suggested in the OGSI reports

I acknowledge the uncertainty related both to the applicability of provincial site index estimates to the Merritt TSA, and to the ultimate performance of stands relative to their potential. However, data from the paired-plot study clearly demonstrates that stands are growing at a faster rate than would be expected based on measurements from the standing old growth inventory. Given existing silvicultural requirements to establish free-growing stands, it is reasonable to expect that the majority of managed stands in the Merritt TSA will be fully stocked, and managed to minimize losses to pests and competing vegetation. Therefore, while the exact magnitude of the productivity increase is not certain, I believe it is highly reasonable to expect that most second-growth stands will grow more quickly than productivity estimates from old-growth stands would suggest. In this determination, I will account for an upward influence on timber supply in the mid to long term to reflect these conditions. I will discuss my considerations of this further under 'Reasons for decision'.

I note that collecting and assessing local data would improve confidence about the magnitude of site productivity adjustments appropriate for the Merritt TSA. I strongly encourage collection of such information from stands within the TSA over the term of this determination.

- use of select seed

The Forest Practices Code requires the use of the best quality seed or vegetative material available for regenerating harvested sites. Select seed produced from seed orchards is the product of the forest gene resource management program in B.C., which uses traditional tree breeding techniques to select naturally occurring, well-adapted, healthy and vigorous trees.

Select seed from seed orchards produces trees that grow faster than trees grown from natural stand seed. The magnitude of improvement varies by species and site. A stand of such trees is predicted to have a greater volume than a natural stand of the same age and species composition. Current expectations are that the volume increases associated with improved seed will decrease beyond a certain stand age.

No adjustments were applied to account for the use of select seed in the base case forecast for the Merritt TSA. However, district staff indicate that 12 percent of lodgepole pine seedlings and 55 percent of spruce seedlings used for regeneration during 1998—2000

originated from improved seed. Based on the current level of select seed use, it is estimated that long-term timber supply would be 2.1 percent higher that in the base case.

I have considered the information regarding the use of select seed in the Merritt TSA. I am satisfied that it is appropriate to account for the timber supply implications of the current level of use, and discuss this issue under 'Reasons for decision'. While future use is projected to increase and there would be corresponding increases in timber supply, they can be incorporated into future determinations once the increased level of use is clearly demonstrated.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

Expected time for forest to re-established following harvest

I have reviewed the information regarding regeneration delay, impediments to regeneration and not-satisfactorily-restocked areas, and I am satisfied that the assumptions in the analysis for these factors appropriately represent current management and available information. As a result, I will not discuss my considerations of these factors further in this rationale.

(iii) silviculture treatments to be applied to the area,

Silvicultural treatments to be applied

I have reviewed the information regarding silvicultural systems, commercial thinning and incremental silviculture, and I am satisfied that the base case assumptions for these factors appropriately represent current management and available information. Consequently, I will not discuss my considerations in further detail in this rationale.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Timber harvesting

I have reviewed the information regarding decay, waste and breakage used in the analysis for the Merritt TSA, and I am satisfied that the factors were appropriately modelled in the analysis. Therefore, I will not discuss my considerations in this rationale.

- utilization and compliance

Utilization and compliance refers to the standards and practices required under the terms of district cutting permits. Utilization standards are assumed when generating timber volume estimates for timber supply analyses. The assumption in the analysis is that these utilization standards will reflect those employed in the field when measuring harvested volumes and comparing them to the AAC. Any difference between analysis assumptions and operational standards requires that analysis results be adjusted to account for the volume difference.

In the timber supply analysis, the following utilization standards were assumed: for lodgepole pine, a 12.5-centimetre minimum diameter at breast height (DBH), 30-centimetre maximum stump height and 10-centimetre minimum top diameter; for all other species, a 17.5-centimetre DBH, and the same 30-centimetre maximum stump height and 10- centimetre minimum top diameter.

District staff note three instances where actual utilization is higher than what has been modelled. The largest impact occurs in the smallwood pine component where cutting permits require a higher standard (7.5-centimetre DBH, 20-centimetre maximum stump height and a 7-centimetre minimum top diameter). Yield models used for the analysis were not calibrated for this utilization level, thus the volume estimates used in this analysis underestimate the volume recovered from small-wood pine stands. The higher utilization standard results in additional volume recovery from the 93 500 hectares being administered under the smallwood pine partition. A *Smallwood Inventory Report* (1995) noted that the volume increase varies across the area classified in the inventory as smallwood depending on the actual stand attributes. That is, some stands that fall within the smallwood category based on the inventory have smallwood characteristics, while some contain trees that are of sawlog quality. In stands that actually exhibit smallwood characteristics, the utilization-related increase was estimated to be 58 percent, while in stands with a sawlog component, the increase was 20 percent. Overall, the increase has been estimated as 25 percent above the volumes estimated for smallwood stands in the base case. These estimates are based on district staff review of timber cruise plots relating to approximately 500 000 cubic metres of small wood timber. As part of these cruises, volumes were calculated to the two different utilization levels, therefore I am reasonably confident in the approximation of the volume underestimate. Analysis undertaken subsequent to release of the Merritt TSA timber supply analysis report indicated that a 25 percent increase in smallwood volume recovery could support a harvest 62 500 cubic metres per year higher than in the base case for the next 60 years, the same timber period over which the current partition is projected in the base case. Therefore, I will consider this issue as having an upward influence on timber supply in the short and medium terms.

A second factor is the increase in volume due to mechanical falling as a standard practice reported in nearly 80 percent of the TSA. Mechanical falling lowers the stump height on average from 30 to 15 centimetres. Based on average tree and stand characteristics, district staff estimate that utilization to a lower stump height increases harvested volume by 34 000 cubic metres annually. The higher utilization levels under mechanical falling are not licence requirements, however, I understand them to be a result of standard practices. I therefore conclude that lower stumps under mechanical falling exert an upward pressure on short- and medium-term timber supply relative to the base case. Given the lack of licence requirements for the lower stumps, I request that the practice continue to be monitored for consideration in future determinations.

The third instance is a replaceable forest license (35 100 cubic metres per year) under which lodgepole pine is harvested to smallwood utilization standards. Staff attribute 8750 cubic metres per year of additional volume to the difference between analysis assumptions and operational practice. I have been made aware of a possibility that upon replacement of the one licence, utilization standards could revert to sawlog levels. I acknowledge that licence requirements may change over time, however, that possibility exists for all licences. Until, the licence requirement changes, I consider the higher utilization under this licence to place upward pressure on short- and medium-term timber supply relative to the base case.

I must stress that the volume increases noted are due to differences in how much of the standing timber volume operators harvest from a given area, not to the harvesting of more area.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the are for the purposes other than timber production.

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are co-ordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

To manage for resources such as water quality and aesthetics, current harvesting practices limit the size and shape of cutblocks and amount of disturbance (areas covered by stands of less than a specified height), and prescribe minimum green-up heights for regenerated stands on harvested areas before adjacent areas may be harvested. Green-up requirements provide for a distribution of harvested areas and retention of forest cover in a variety of age classes across the landscape.

In the timber supply analysis, management objectives for values other than timber were represented either by definition of management zones and application of forest cover requirements, or by land base exclusions. The management zones—community watersheds, visuals, ungulate winter range, and integrated resource management—reflect different operational considerations.

I have reviewed the information presented to me regarding the analysis assumptions for cutblock adjacency, recreation, First Nations, ungulate winter range, elk corridors, lakeshore management zones, and forest-to-grassland reversion, and I am satisfied that the analysis has appropriately reflected management objectives within these areas. As a result, I will not discuss my considerations of these factors in further detail within this rationale document. The factors discussed below are those for which I believe my considerations require specific explanation.

- visually sensitive areas

For the analysis, visual management requirements were applied to individual visual management polygons. Each visual management polygon is managed according to one of four visual quality objectives (VQOs). These VQOs refer to level of acceptable landscape alteration resulting from timber harvesting and site disturbance. The VQO defines the amount of acceptable alteration permitted.

At this time, the majority of VQOs in the Merritt TSA are recommended since they have not been formally established under the Forest Practices Code or an LRMP. Only VQOs inside lakeshore management zones of A, B, C, lakes have been formally established by the District Manager. The recommended and established VQOs were modelled in the base case.

While the recommended objectives are not legally binding, district staff inform me that licensees are normally including the recommended objectives as part of operational plans.

A substantial portion of the visually sensitive area in the TSA is subject to selection harvesting. It was assumed for the analysis that no additional forest cover requirements need to be applied to achieve VQOs in the selection harvesting areas.

Merritt district staff have informed me that the visual landscape inventory in the TSA requires improvement. Weyerhaeuser currently holds a multi-year funding agreement with an objective to improve the quality of the TSA visual inventory.

I have stated in my guiding principles that I will not speculate on land use or management decisions, such as establishment of visual quality objectives that are the responsibility of another decision maker. However, while the existing recommended VQOs have not been formally established for the majority of the visually sensitive areas, they are being employed in operational planning, and visual management is well-established throughout the TSA. In addition, while I accept that the visual inventory could be improved, it currently represents the best information on visual resources in the area, having been prepared by experts in the field. I therefore, believe it is reasonable to accept that visual quality will continue to be a focus of forest management, and that the best available information was used in the analysis.

Finally, I recognize that the base case incorporates an assumption that selection harvesting will play a significant role in allowing timber extraction while achieving VQOs. I am prepared to accept this assumption at this time based on experience in other areas of the region and province. However, the assumption should be field tested, and any appropriate adjustments made in future analyses.

In conclusion, I accept that the modelling of visual quality management in the base case reasonably reflects current and expected management. In the absence of a public planning process such as an LRMP that would provide further recommendations on visual management objectives, I encourage the district manager to clarify the objectives and management regime for visual resources in the Merritt TSA. Finally, I encourage collection of improved visual inventory information and documentation of the role of selection harvesting in achieving visual management objectives for use in future analysis and determinations. I will make no related adjustments in my determination.

- identified wildlife habitat

Species and plant communities are identified as identified wildlife in the Forest Practices Code if it is believe their survival requires special management strategies. Several endangered, threatened, vulnerable and regionally significant species and communities that are not believed to be sufficiently protected under existing management strategies have been established as identified wildlife under the provincial Identified Wildlife Management Strategy (IWMS). Existing management strategies include those for biodiversity, riparian areas, and ungulate winter range

Volume I of the IWMS lists nineteen identified wildlife species that may occur in the Merritt TSA: bull trout, tailed frog, rubber boa, racer, gopher snake ssp. deserticola, American bittern, northern goshawk, ferruginous hawk, prairie falcon, long-billed curlew, Lewis's woodpecker, white-headed woodpecker, yellow-breasted chat, bobolink,

mountain beaver, fisher, grizzly bear, mountain goat, and bighorn sheep. Volume II, which has yet to be released, may identify additional species. Habitat requirements for the species identified in Volume I will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs), or through other management practices specified in Forest Development Plans. To date, only five WHAs have been established in the Merritt TSA. It is not known at this time the exact location or amount of additional areas where harvesting will be excluded of modified as part of the IWMS.

The Ministry of Water, Land and Air Protection (MWLAP) has provided locations of IWMS species and also other species (such as Cascade mantled ground squirrels and flammulated owls) and requested special management considerations. Merritt district staff believe that any impacts incremental to the IWMS should be minor. While I will make an adjustment to account for management of IWMS species I am aware of no specific provisions under the Forest Practices Code or other plans for the other noted species. I note that the biodiversity and other general provisions of the Code are also designed to provide habitat for wildlife. I encourage MWLAP and MOF staff to work together to identify how non-IWMS species should be considered in forest management in the TSA.

While implementation of the IWMS is still underway in the Merritt TSA, and the ultimate impacts are unknown, I believe it is reasonable to expect that additional measures will be taken to protect habitat. Given the Province's commitment to implement the IWMS, and to limit short-term timber supply impacts to one-percent province wide, I find it appropriate to account for a one- percent impact on timber supply. I will discuss this further under 'Reasons for decision.'

- grizzly bear habitat

A draft grizzly bear recovery plan affecting the Merritt TSA has been proposed. The plan provides objectives and strategies aimed at minimizing impacts on bears and their habitats with goal of restoring the North Cascades population to a viable status by 2050. The plan provides for implementation of WHAs for grizzly bears and development of various guidelines, including stocking standards for specific riparian and berry producing sites. Since these guidelines have not been finalized they were not incorporated as current management in the base case. District staff advise me that one of the main features of the draft plan is to manage access so that relatively large portions of bear habitat will be free of development activities during periods of bear activity. Therefore, scheduling of harvesting will be affected, however, District staff advise me that an assessment was performed on behalf of the North Cascades Grizzly Bear Recovery Team that showed that timber supply impacts should be minimal. However, if the plan were to be implemented, more assessment and monitoring would have to be undertaken. I have been informed that licensees are voluntarily implementing Ministry of Water, Land and Air Protection guidelines in selected drainages to help manage for the bears in these areas. At this time, available information suggests that these guidelines should have no impact on the size of the timber harvesting land base, and no significant effects on access to timber within the timber harvesting land base.

Accordingly, I will make no adjustments on this account. If a recovery plan is approved, and its implications vary substantially from the conclusions I have made here, I can revisit my determination if necessary. Alternatively, the implications of a final plan can be assessed in a future determination.

- riparian management

Riparian areas occur along streams, around lakes and in wetlands. To protect riparian and aquatic habitats, the Forest Practices Code requires the establishment of riparian reserve zones where timber harvesting is excluded, and riparian management zones where harvesting may be limited. A comprehensive stream classification inventory is not available for the Merritt TSA. MoF staff estimated the area needed in riparian reserves and management zones next to streams based on a detailed assessment of one draft landscape unit. The sample landscape unit—Smith Willis—covers about 7 percent of the total TSA. Additionally, wetlands and lakes were classified for the entire TSA and buffer areas estimated according to the Forest Practices Code guidelines. The findings of this assessment were extrapolated to the entire TSA. Application of these estimates to the entire TSA, resulted in a deduction of 29 547 hectares, or 3.6 percent from the productive forest land base.

In addition to the above, 2491 hectares of forest were excluded from the timber harvesting land base to account for management around lakes classified through the Merritt TSA Lakes Classification process. As referenced earlier under "Integrated resource management objectives", I considered the methods and information related to lakeshore management, and accept them as satisfactory for use in my determination. For future determinations, I encourage collection of additional riparian information and the pooling of all information for the TSA to strengthen the estimate of the area exclusion for riparian protection.

A number of factors related to streamside riparian management create potential upward and downward influences on the base case timber supply, as discussed in the following two paragraphs.

The potential upward influence is a high likelihood that some streams classified as S4 in the assessment done for the timber supply analysis are actually S6. This conclusion is based on review in the Kamloops forest region of streams classified as S4. The review suggests a trend, but does not provide statistically robust evidence on the potential quantitative impacts.

Potential downward influences on timber supply are: isolation of timber when cutblock boundaries are located outside riparian management areas; management practices that provide more protection than Forest Practices Code guidelines; presence of bull trout in some areas that will result in classification of more streams as S4 and application of "temperature sensitive stream" management measures (see *temperature sensitive streams*, below). Isolation of timber does not appear to be a TSA-wide issue, and occurs primarily in areas of specific hydrological concerns. With respect to bull trout, while critical trout habitat is addressed as part of the IWMS, the temperature sensitive stream considerations are separate and cover large stretches of streams than the more focused wildlife habitat areas of the IWMS. It is expected that more streams will receive an S4 classification and therefore that the area within riparian management areas will expand beyond what was

modelled in the base case. The size of the additional area is not known at this time, although bull trout are believed to inhabit only a small number of watersheds in the TSA, which limits the likely additional area required.

Licensees have expressed uncertainty about whether or not the landscape unit used in the stream assessment represents average conditions in the TSA. I acknowledge this concern, however I am aware of no evidence that verifies it or suggests whether the sample landscape unit would tend to under- or over-estimate the area subject to riparian management measures.

In conclusion, there are uncertainties that potentially work to increase and decrease timber supply, and the net effect of the upward or downward influences is not clear. I also observe that the level of land base exclusion related to riparian area used in the Merritt TSA base case is comparable to other interior management units. I therefore accept the approximation of riparian management requirements used in the base case as satisfactory for this determination, and encourage collection of further information for consideration at the next AAC determination.

- temperature sensitive streams

In January 2000, the Merritt District Manager and Designated Environment Official jointly made known a number of fish-bearing streams within the Nicola watershed as "temperature sensitive streams" under the Forest Practices Code. The Timber Harvesting Practices Regulation requires retention of adequate shade on specified temperature sensitive streams.

An assessment was undertaken to estimate the implications of management requirements for temperature sensitive streams relative to the assumptions used for riparian management in the base case. The assessment assumed that for S1-S4 streams, the buffers assumed in the base case would be adequate to maintain desired stream temperature, and that increased retention levels would be needed only on direct tributaries to the temperature sensitive streams. For the assessment, it was assumed that a buffer of between 15 and 20 metres on one side of direct tributaries would be adequate to meet the requirements. Results indicated that an additional 400 to 550 hectares of timber harvesting land base (0.07 percent) more than provided in the analysis would be required.

The January 2000 designation covers an area larger than evaluated in the assessment discussed above by about 33 percent. It is also possible that a greater amount of retention will be required to manage for stream temperatures over that assumed in the assessment. Stream temperature monitoring studies are currently underway in the Nicola Watershed that may provide additional information.

In addition to designated temperature sensitive streams, Merritt TSA licensees have voluntarily agreed to manage for shade on all other non-designated S4-fish-bearing streams within the Nicola watershed. The impacts of this voluntary management have not been assessed but are believed to be minor and are likely covered by application of the riparian management assumptions used in the base case.

In conclusion, I accept that management for temperature sensitive streams will likely result in increased retention levels on some streams beyond what was accounted for in the base case. It is expected that the additional area required for management is less than

1000 hectares of productive forest land. I will also accept that voluntary management for shade on S4 streams has been adequately accounted for through standard riparian management reflected in the base case. Therefore, I conclude that management along temperature sensitive streams exerts a slight downward pressure on the base case timber harvesting land base of about 0.15%. I discuss this factor in "Reasons for decision."

- community watersheds

The Forest Practices Code provides a definition and management considerations for community watersheds, including watershed assessment procedures (WAPs). The Merritt TSA contains 10 designated community watersheds that contain 1.6 percent of the timber harvesting land base.

Recent infrastructure development in the Dillard Community Watershed has led to relocation of the intake from Dillard Creek to Missezula Lake. This change may result in an application for a new water license for the Missezula Lake area. It is uncertain whether the existing licence for Dillard Creek will be discontinued or be maintained. Therefore, while it is likely that the area under community watersheds will increase due to relocation of the intake, the magnitude is uncertain.

A second issue relates to the green-up requirements applied in the community watersheds in the base case (maximum of 20 percent of the timber harvesting land base in the watersheds can be covered with stands less than 6.6 metres in height at any time). Based on Interior Watershed Assessment Procedures (IWAPs) completed in most community watersheds in the district, and detailed assessments over a limited area, district staff estimate that a maximum equivalent clearcut area (ECA) of 25-30 percent should be adequate to protect water quality in community watersheds. Forest cover requirements associated with this ECA level would be less restrictive on timber supply than the requirement applied in the base case. No sensitivity analysis was done to examine issues specific to community watersheds. However, based on the area subject to watershed requirements and the magnitude of potential change in applicable green-up requirements, any timber supply impacts would be very small.

In conclusion, I acknowledge that the area under designated community watersheds may increase in the TSA, but the magnitude of change is currently uncertain. For this determination, I will not speculate on the outcome of the licence process. Changes in official designations can be reflected in future determinations. With respect to maximum ECAs, the assessments and estimates made to date indicate that applicable green-up requirements may be less limiting than applied in the base case. However, given the magnitude of change suggested and the relatively small area involved, any impact would be small. Over the term of this determination, I request that management requirements in community watersheds be assessed in more detail so that improved information will be available for the next determination. I will make no adjustments to the base case timber supply related to community watershed management.

- stand level biodiversity

To provide habitat for the conservation and enhancement of wildlife and to help maintain stand-level biodiversity, wildlife tree patches (WTPs) and wildlife trees (WTs) are retained.

In the Merritt district, patches are retained more commonly than individual trees, however both have been applied in the TSA since 1996. In the base case, retention of WTPs larger than two hectares in size were modelled by a 2 percent land base reduction. Patches larger than two hectares can contribute to landscape-level biodiversity requirements. Retention of smaller WTPs and WTs were represented by a 2 percent reduction in timber yield estimates. In areas of the Merritt TSA where selection harvesting is practised, it was assumed that single wildlife trees retained after harvests would meet stand-level biodiversity requirements. These modelling approaches were based on assessment of silviculture prescriptions and the *Landscape Unit Planning Guide*. The method is described in the *Merritt TSA Analysis Report*, March 2001.

One assumption used in developing the modelling approach was that 50% of WTP requirements would be met by forest outside of the timber harvesting land base, or by trees not currently included in the volume estimates (e.g., veterans). However, the results of an assessment of WT and WTP retention showed that out of 3422 hectares of WTPs, only 25 percent of the areas was outside the timber harvesting land base. The implication is that WTPs potentially cover 1-2 percent more of the harvestable area than estimated in the base case.

In the Merritt TSA, Douglas-fir trees are frequently reserved when lodgepole pine stands are harvested, particularly if large openings are created where mountain pine beetle control and salvage is underway. These stand-level reserves are retained primarily to achieve biodiversity objectives by enhancing species diversity and stand structure. The retained trees also provide shade and seed. This single tree retention is incremental to the retention for stand-level biodiversity described above. It is anticipated that while some of this volume may be harvested in the future, some of it will be retained permanently. Therefore, for the base case, yield estimates pine-fir mixes were reduced by 15 cubic metres per hectare to account for Douglas-fir retention. This level of retention was estimated by staff and has not been verified through field sampling. Further fieldwork is required to provide more certainty about the level of volume retention.

I am aware that submissions from licensees and BC Environment expressed concerns about the magnitude of reductions for WTPs and WTs used in the analysis. However, those retention levels, modified by the considerations above, were based on either assessment of prescriptions and existing guidelines, or on professional experience and judgement. The submissions referenced above provide no conclusive evidence that refutes the information used in the analysis and subsequently presented to me by MoF staff. I believe the information provided to me by district staff is the best available at this time, and I accept it as satisfactory for my determination. However, I request that WTP and WT retention be evaluated as part of landscape unit planning.

To summarize, I accept the assessment that the role of forest outside the timber harvesting land base was likely overestimated in the base case, and that the impact is a potential reduction in the timber harvesting land base of between 1 and 2 percent. I accept that the modelling of Douglas-fir retention in pine-fir mixes reflects the best available information and current management, and will make no adjustment with respect to this issue for this determination. However given the level of uncertainty, I request that management in these stands be monitored so that improved information will be available for future analysis and

determinations. In addition, district staff should investigate the extent to which retained Douglas-fir should be included in the area of WTs or WTPs. I will discuss this factor in "Reasons for decision."

- landscape level biodiversity

The *Landscape Unit Planning Guide* describes current policy on planning for and managing biodiversity at the landscape level. Landscape-level biodiversity management focuses on ensuring old forest is retained in each forest ecosystem in each landscape unit. Currently, landscape units and corresponding biodiversity emphases are in draft form in the Merritt TSA. Therefore, in the base case, old-seral requirements were modelled using a single weighted forest cover requirement for each landscape unit—biogeoclimatic unit combination, based on the anticipated distribution of 45 percent lower, 45 percent intermediate and 10 percent higher biodiversity emphasis. In deriving the cover requirements for modelling, it was assumed that the low emphasis portion the old-forest cover requirement would be phased in over time. In the analysis, forest outside of the timber harvesting land base contributed to old-forest requirements. In the base case, this forest was assumed to age continuously over time.

In general, the analysis approach and information used followed provincial policy and the *Landscape Unit Planning Guide*. Sensitivity analysis showed that if full old-forest requirements were applied immediately in landscape units with low biodiversity emphasis, the long-term timber supply would decline by 1 percent. The analysis results suggest that it may be possible for landscape unit plans to achieve full old-seral objective in the short term in low-emphasis units. However, since the base case followed existing direction on landscape-level biodiversity, I will accept the phase-in approach used in the base case as appropriate for use in this determination.

Another aspect of current biodiversity management policy is that mature-seral requirements should not be implemented if they would have a timbersupply impact. Sensitivity analysis shows that applying requirements for mature forest as well as those for older forest reduces medium-term timber supply slightly. Analysis also showed that applying requirements for young forest in addition to mature- and old-forest had no impact beyond that of adding the mature requirements. These results may assist in landscape unit planning, but as discussed previously, the modelling approaches to both phase-in of old-seral requirements in low emphasis landscape units, and mature and early seral requirements, follow existing policy, and I will make no related adjustments.

There is generally concern that the use of average old-seral requirements may not accurately reflect the ultimate impact of managing specific landscape units according to a particular emphasis. The weighted-average approach was taken to avoid speculation on the outcome of landscape unit planning, while recognizing that old-seral requirements would be applied. Sensitivity analysis included in the analysis report suggests that applying landscape-level biodiversity requirements according to the draft biodiversity emphases applicable to individual landscape units, with no phase-in in low emphasis areas, reduces long-term timber supply by a small amount (1 percent). The small impact shown in the sensitivity analysis provides some confidence that the modelling approach used in the base case for landscape biodiversity is satisfactory.

In practice, retention of old-seral forest to meet landscape-level biodiversity objectives involves establishment of old growth management areas (OGMAs). Since landscape unit planning is not complete in the Merritt TSA, OGMAs have not been established throughout the area. For the analysis, no spatially specific OGMAs were delineated. Rather, areas were chosen for retention based on age alone (within landscape unit—biogeoclimatic unit combinations). There is some concern that when OGMAs are located and delineated in the field, the timber supply impact will be greater than indicated in the timber supply analysis. I acknowledge this likelihood, however I have no information on the potential magnitude of impact. In future analyses, I anticipate that spatially-specific OGMAs will be represented in the forest inventory and can be excluded from the timber harvesting land base.

For the base case harvest forecast, it was assumed that forests outside the timber harvesting land base will continue to age over time so that, eventually, they will all be classified as old seral. This modelling approach was taken because modelling of natural disturbance and succession is complex and subject to much uncertainty. Nevertheless, I believe it is reasonable to expect that forest in the Merritt TSA, including that outside the timber harvesting land base, will be subject to disturbance. The assumption in the base case would therefore lead to an optimistic assessment of the role of forest outside the timber harvesting land base (that is, non-contributing forest) in achieving biodiversity objectives. For a sensitivity analysis, it was assumed that 400 hectares (0.25 percent) of non-contributing forest would be disturbed annually. At that rate of disturbance in the non-timber harvesting land base, the long-term harvest level would be decreased by 5% relative to the base case.

I belive that the base case modelling assumption that forest outside the timber harvesting will age continuously resulted in an overestimate of long-term timber supply. The magnitude of overestimate is unknown given uncertainty about the disturbance rate and pattern, however, analysis suggested the long-term level may by approximately 5 percent lower than the base case. I will discuss this further in "Reasons for decision."

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

- *harvesting sequence*

One assumption that must be made when modelling timber supply is how priorities are set for choosing eligible stands (i.e., those above minimum harvestable age and not needed for other values) for harvest. The harvest sequence can be set using a variety of options. The three most common are, oldest first (absolute or relative to the minimum harvestable age), youngest first (after some minimum age requirement) and random.

In the analysis, the relative oldest first harvest priority rule was used. However in practice, the district's harvesting priorities are determined mostly by the objective to limit further damage by the mountain pine beetle epidemic and to salvage damaged timber. Operational harvesting priorities are not entirely random, since the beetle tends to target older lodgepole pine stands.

Sensitivity analysis compared forecasts resulting from application of youngest first and random priorities to the base case (relative oldest first). Results showed that the relative oldest first rule resulted in the highest forecast in the medium to long term. Short-term supply remained unchanged from the base case. Therefore, while the impact of current

operational priorities relative to the base case is not precisely quantifiable, the analysis indicates that any deviation from relative oldest first would reduce supply.

Therefore, I believe that since it is likely that operationally there will be deviations from a relative oldest first priority, medium- to long-term timber supply will be lower, but to an undetermined amount, than indicated in the base case. I will consider this further under my 'Reasons for decision'.

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

- alternate harvest flows

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large volumes of older forests often permits harvesting above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

The base case represents only one of several harvest forecasts that could be achieved for the Merritt TSA given the current management regime and objectives. The *March 2001 Merritt Timber Supply Area Analysis Report* outlines some of these forecasts, ranging from an even-flow 23 percent below the pre-uplift AAC of 1 445 550 cubic metres, to a declining flow with an initial level 35 percent higher than the pre-uplift AAC. The current mature state of the Merritt TSA forest presents some hazard of loss to insects, as evidenced by the ongoing beetle infestations, and fire losses. Given these hazards, there may be sound management reasons to increase the AAC above the current (pre-uplift) level, however, specific analysis that examines these issues and management options in more detail is not available.

In their submission, the Shuswap Environmental Action Society (SEAS) maintains that implementation of Forest Practices Code should have led to a reduction in the AAC. SEAS also allege that the base case timber supply forecast depends on addition of low quality and difficult-to-harvest forest to the timber harvesting land base since the previous analysis. I note however, that the base case incorporates Code requirements and land base exclusions related to timber merchantability and terrain stability. Therefore, I believe the assumptions used in the base case represent reasonable measures to address the issues noted by the SEAS.

In conclusion, I am satisfied that the harvest flow pattern reflected in the base case harvest forecast is satisfactory for this determination.

Community implications

I have reviewed the information presented in the socio-economic analysis for the Merritt TSA, and I am aware of the implications to communities of changes in harvest levels for the TSA.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Timber processing facilities

I have reviewed the information regarding timber processing facilities, and I am mindful of the reliance of timber processing facilities on the volume harvested in the TSA.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia,

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). The letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end, he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

The memorandum promotes careful review of visual quality management to ensure that it is not overly constraining timber supply in light of the attention to ecological objectives required in the Code.

I have considered the contents of the letter and memorandum in my determination of an AAC for the Merritt TSA. A partition for harvesting in smallwood pine stands forms an important part of my AAC determination.

Local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives. Public response was received to the information report and data package, and to the timber supply and socio-economic analyses. The summary of public input is reproduced in full as Appendix 5.

Local objectives have been an important consideration in my determination of an AAC for the Merritt TSA. I have considered all public input received on the timber supply review, and where relevant I have attempted to respond briefly to this input in this rationale.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Abnormal infestations and salvage

- AAC uplift

An AAC uplift is a temporary increase in the AAC to address some major disturbance to the timber supply. In the case of the Merritt TSA, a mountain pine beetle outbreak and a large wildfire (Lawless Creek) resulted in the urgent request to temporarily increase the AAC of the Merritt TSA. The *Merritt Timber Supply Area Rationale for Annual Allowable Cut (AAC) Uplift Determination* effective January 1, 1999, provided an AAC uplift of 550 000 cubic metres per year. The uplift allocated 400 000 cubic metres for pine beetle and 150 000 cubic metres for wildfire salvage. The district manager has informed me that the AAC uplift is no longer required to salvage the timber damaged or at risk due to these events. I accept the District Manager's assessment that ongoing salvage efforts can be managed without maintaining the uplift. Therefore, in this determination, I will terminate the uplift.

- unsalvaged losses and salvage program

Unsalvaged losses are timber volumes destroyed or damaged by agents such as fire and disease that are not recovered through salvage operations. A number of insects, parasites, fungi or plants can kill trees or degrade the quality and value of logs. Estimates for unsalvaged losses account for epidemic (abnormal) infestations on the timber harvesting land base that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect existing stands (endemic losses) are generally accounted for in inventory sampling for existing timber yield estimation or though other methods. Endemic losses associated with second-growth stands are addressed under *operational adjustment factors*.

In the analysis for the Merritt TSA, 143 626 cubic metres per year in unsalvaged losses were assumed at the start of the analysis horizon. Of this amount, 93 841 cubic metres were attributable to insects and disease, a further 31 220 cubic metres to wildfire, and 18 565 cubic metres to windthrow. The total is 26 716 cubic metre per year (22 percent) higher than used in the 1994 analysis. District staff indicate that over 80 percent of the conventional AAC has been directed at salvage or beetle control.

In their submission, the SEAS points out their concern that the unsalvaged losses do not account for the likely need to increase harvests temporarily in the future to address future epidemics. I acknowledge that the standard TSR approach to unsalvaged losses, which is to deduct an estimate of the average loss, does not fully reflect the random variability of disturbance events over time. However, the average does incorporate historic losses in years when losses were small, average and large. I continue to encourage development of analysis techniques that allow more comprehensive assessment of the role of disturbance in

ecosystem dynamics and the implications for resource management. At this time, however, I believe the approach used in the base case employed the best available information.

- spruce bark beetle

In the base case, losses attributable to spruce bark beetle were estimated to be 40 834 cubic metres per years based upon a 1999 survey. In 2001, district staff reviewed unsalvaged loss estimates to spruce bark beetle and derived a new estimate that is 15 834 cubic metres per year lower than the estimate used in the base case. The survey identified WTPs, OGMAs, better road access, some double accounting due to the Lawless Creek fire, and the lack of susceptible host material as essential factors in this over-estimation. I am aware that this revised level is still double the estimate used in the TSR 1 analysis. I accept the decreased estimate of spruce bark beetle losses, which places an upward influence on timber supply relative to the base case, as discussed in "Reasons for decision."

- mountain pine beetle update

The area affected by mountain pine beetle has doubled since 1997, however the district believes that aggressive salvage and control measures including small scale harvesting, single tree disposal treatments, baiting and surveying will bring the area affected to pre-uplift levels. However, staff point out that the forest in the district is characterized by an abundance of mature pine that is very susceptible to further attack. The relative abundance of mature and over-mature lodgepole pine in the TSA almost guarantees that the mountain pine beetle will continue to be one of the major management issues in the TSA. I am acutely aware of the importance of this issue in this TSA and encourage the district and licensees to continue their aggressive control efforts and ongoing salvage of mountain pine beetle damaged timber. These salvage efforts must include a focus on the less desirable low-volume stands. District staff also note that in the past, operational constraints have negatively affected their attempts to manage the beetle. I am prepared to review this AAC decision should the mountain pine beetle population incidence return to levels that exceed the ability of the operators to effectively control it. In the meantime, I accept the estimates of losses due to mountain pine beetle used in the base case.

- Lawless Creek wildfire

To estimate fire losses, district staff compiled fire history values for the past 15 years. Staff acknowledge that estimates of fire losses are highly uncertain given the many factors that determine fire timing, location and severity in the future. The period initially used to calculate average fire losses included both the 1998 Lawless Creek and the Say fire of 1984. In an attempt to derive a figure that more realistically portrayed average losses due to fires, District staff used fire data for the last 14 years. These data exclude the large Say fire (1984) because there is large uncertainty about the unsalvaged loss estimates for that fire. However, the 14-year period includes the large Lawless Creek fire. Based on this revised estimate, district staff believe that fire losses are 7374 cubic meters per year lower that estimated for the base case. The reduction is due to the current level of fire suppression in the TSA and intensive efforts to recover fire damaged timber from the Lawless Creek fire. I have reviewed the information and values and concur with the assessment of district staff.

Over the two years prior to the timber supply analysis, approximately 200 000 cubic metres of damaged timber from the Lawless Creek fire were harvested under the conventional AAC and an additional 300 000 cubic metres was harvested under the uplift volume. However, the effects of the fire were accounted for in the base case by revising the inventory. Since these two years of fire salvage harvesting are included in the base case, and the base case forecast includes harvesting done over the two years leading up to the analysis, there has been a double counting. The inventory has been depleted twice by 200 000 cubic metres: once when the underlying inventory information was adjusted, and again when the inventory was harvested in the model. Therefore, there is a very small upward pressure on growing stock in the short term, amounting to about 0.2 percent (200 000 cubic metres divided by 98 million cubic metres of mature timber).

- unsalvaged losses conclusion

I conclude that the figure for unsalvaged losses used in the base case over-estimated average losses by 23 208 cubic metres, due to over-estimation of the impact of spruce bark beetles and wild fires. There is also a very small upward pressure on growing stock in the short term, amounting to about 0.2 percent due to overlap between the inventory adjustment to account for the Lawless Creek fire, and harvesting of fire damaged timber under the conventional AAC. This difference affects timber available for harvest over the medium term.

I encourage district staff to continue to monitor trends such that additional information can be incorporated into future timber supply analyses. In particular, I agree with SEAS that the inventory data indicates many of the stands in the Merritt TSA are approaching age and diameter thresholds that will make them more susceptible to attack from insects such as bark beetles. I request that district staff continue to monitor and track loss estimates carefully so that future determinations can account for any losses which may result over time as a result of stand dynamics. I will make adjustments if needed in the next determination.

Reasons for decision

In reaching my AAC determination for the Merritt TSA, I have considered all of the factors presented to me, and I have reasoned as follows.

The base case harvest forecast from the March 2001 timber supply analysis indicated that a harvest level of 1 454 250 cubic metres per year could be maintained for six decades. Thereafter, the projected harvest level declines by approximately 9 percent per decade until reaching a long-term harvest level (LTHL) of 1,120,000 cubic metres in decade nine.

Section 8 of the *Forest Act* requires me to consider a number of factors when determining an AAC for a timber supply area. Having reviewed factors related to the land base contributing to timber harvesting, the existing forest inventory, and the expected rate of growth I am satisfied that the majority of the assumptions applied in the base case appropriately reflect the best available information and current practices. However, I have identified a number of forest management issues that either lead to changes in analysis assumptions relative to the base case, or create uncertainty. Some of these factors can be quantified and their impacts assessed with some dependability. Other factors may

influence the timber supply by adding an element of risk or uncertainty to the decision but cannot be reliably quantified at the time of this determination.

Following is a summary of the factors that my considerations indicate require an adjustment to the timber supply projected in the base case. First, I will discuss factors that increase the estimate of timber supply relative to the base case.

- under estimation of timber supply

1. *Improved seed* — no genetic gain was assumed in the analysis. Based on seed orchard data for lodgepole pine provided by Tree Improvement Branch and current levels of use of improved seed, a 2.1 percent upward pressure can be assumed to act primarily in the long term.

2. *Utilization standards* – utilization standards being employed in smallwood stands are higher than what was modelled in this base case. Estimates of recovery from smallwood sites average about 25 percent higher than in the base case. I have concluded that these higher utilization standard can support an increase in harvests from stands identified in the forest inventory as smallwood (the smallwood land base) of 62 500 cubic metres per year. This increase applies to the short and medium terms.

   On the conventional land base (that is, in traditional sawlog stands) one licensee is operating to smallwood utilization levels, and mechanical falling is resulting in lower stump heights than assumed in the base case. These latter two factors place upward pressures on timber supply, estimated as 8750 cubic metres per year, and 34 000 cubic metres per year, respectively. At this time, I view these increases to apply in the short and medium terms since the measurements apply to existing, rather than future managed, stands.

3. *Unsalvaged losses* – Based on updated information, estimates of unsalvaged losses to spruce bark beetle and fire used in the base case appear to over-estimate average losses by 23 200 cubic metres, or about 1.6 percent of the short- and medium-term supply, and 2 percent of the long-term level. There is also a very small upward pressure of 0.2 percent on growing stock in the short term due to overlap between the inventory adjustment to account for the Lawless Creek fire, and harvesting of fire damaged timber under the conventional AAC. This difference affects timber available for harvest over the short to medium term.

4. *Old-growth site index (OGSI) adjustments* – studies of site productivity on sites occupied by old growth indicate that long-term timber productivity will likely be significantly higher than projected in the base case. Application of the results of OGSI research suggest that long-term supply could be as much as 20 percent higher than in the base case. However, while the trend of increasing site productivity estimates is consistent throughout the province, local studies are required to verify the effects in specific areas. In addition, assignment of site indexes to smallwood stands based on site index-site series correlations (SIBEC) indicated the possibility of a long-term increase of a further 8 percent.

The factors discussed above act to increase the estimate of timber supply relative to the base case. My considerations also identified a number of factors that act to decrease timber supply compared to that the base case harvest projection, as described below.

- overestimation of timber supply

1. *Temperature sensitive streams* – the District Manager and Designated Environment Official have made known temperature sensitive streams. Management of temperature sensitive streams will likely result in retention levels on some streams that are greater than accounted for in the base case. The additional area required is expected to be less than 1000 hectares of productive forest land, which exerts a slight downward pressure on the base case timber harvesting land base, and timber supply over all time periods, of about 0.15%.

2. *Stand-level biodiversity* – a review of current practices showed that the proportion of wildlife tree patch requirements that would be met outside the timber harvesting land base was over-estimated in the base case. The review suggested that an additional 1.5 percent of the timber harvesting land base is being reserved for WTPs, which places a downward pressure on timber supply over all time periods.

3. *Identified wildlife management strategy* – Implementation of the IWMS is ongoing. Since only five wildlife habitat areas have been established in the Merritt TSA to date and several more are likely, the ultimate impacts cannot be known at this time. However, to acknowledge that the strategy will almost certainly have an impact on timber supply I will assume a downward influence of approximately 1 percent across the entire analysis horizon.

4. *Landscape-level biodiversity* – in the base case it was assumed that forest outside the timber harvesting land base would age continuously. Since all forest is subject to natural disturbance, the contribution of forest outside the timber harvesting land base to old-seral requirements has been over-estimated in the base case. This factor therefore places a downward influence on long-term timber supply of an uncertain amount; however, analysis indicated the influence could be in the general range of 5 percent over the long term.

5. *Harvest sequencing* – a relative-oldest-first priority was applied in the base case. However, harvesting in the district is being determined by objectives to salvage and control the mountain pine beetle epidemic. Sensitivity analysis suggested that the relative-oldest-first priority most likely results in the highest timber supply projection of the range of priority rules, and that any deviation from that rule would reduce supply over the medium and long terms. Deviation of actual harvesting from the relative-oldest first rule introduces an unquantified but likely small downward influence on long-term timber supply.

The factors acting to increase the short-term timber supply, utilization standards and unsalvaged losses, together account for an increase of approximately 9 percent. The downward pressures in the short term include temperature sensitive streams, wildlife tree patches and identified wildlife species. They account for about a 2.7 percent reduction, resulting in a short-term upward pressure of just over 6 percent.

In this determination, I have concluded that on the conventional land base, it would be more reasonable to view the small net upward influence in the short term as having a stabilizing influence on the short-term timber supply rather than to consider increasing the allowable cut at this time. The bulk of the net increase in short term timber supply is attributable to higher utilization levels in stands identified as smallwood in the inventory. Utilization standards being employed in smallwood stands lead to an increase in volume from those stands of about 25 percent above estimates used in the base case. The timber supply impact of the increase could vary over the short to medium term depending on the timing of allocation of the addition supply. For example, the existing smallwood partition could be maintained for longer, or the harvest could be increased in the short and/or medium terms. Given the large timber inventory in this TSA which provides for forest management flexibility, I believe it would be sound to increase the harvest level in stands on the smallwood land base in the short and medium terms.

For my determination, I conclude that it is feasible to increase the short-term timber supply from stands identified as smallwood by 62 500 cubic metres per year, which is approximately 25 percent of the existing smallwood partition.

I acknowledge that access to smallwood timber may be constrained by the existing definition of smallwood. While recognizing that there are legal commitments associated with existing licences, I encourage the district to examine opportunities to modify the smallwood definitions if that would facilitate licence administration, while ensuring good forest management for the entire 93 500 hectare smallwood land base.

In the long term, the factors acting to increase the timber supply include use of improved seed, increased site productivity and lower unsalvaged losses, which together account for an increase that could exceed 30 percent. The downward pressures include management along temperature sensitive streams, wildlife tree patches, disturbances outside the timber harvesting land base that affect landscape biodiversity, and the Identified Wildlife Management Strategy, for a total reduction of up to 7.5 percent in the long-term. The net effect is an increase in the long-term harvest level that could be over 20 percent. A significant portion of this net effect is attributable to increased estimates of site productivity. Given the uncertainty in the ultimate magnitude of impacts of increased site productivity in the Merritt TSA, I would encourage more local studies to verify the trends indicated by the OGSI and SIBEC estimates. I view the likelihood of higher timber productivity as a major stabilizing factor in the medium and long terms in this TSA. I am however, cautious in assessing the magnitude of this underestimation without localized data. Collection of local site productivity data in the TSA, as time and staff resources allow, would be beneficial to allow better assessment of the timber supply implications for the future.

In 1999, I increased the AAC of the Merritt TSA by 550 000 cubic metres to address salvage and control requirements related to a mountain pine beetle infestation and the 1998 Lawless Creek fire. I have concluded that ongoing salvage efforts can be managed without maintaining the uplift and as part of in this determination I will terminate the uplift.

In summary, I am satisfied that timber supply is stable in the short term, and that an increase can be supported by the utilization standards used in stands on the smallwood

land base. The likelihood that future managed stands will produce significantly more volume than indicated by productivity estimates from the existing old-growth stands provides a significant stabilizing buffer over the medium term. I believe that the large mature inventory and the highly operable land base combine to present a wide range of options and potential challenges for this TSA. In particular, the mature inventory exists within an ecosystem characterized by frequent disturbance. Nevertheless there appears to be much opportunity to examine these interactions and maintain management regimes that benefit that full range of objectives even given the forest management challenges.

Determination

I have reviewed and considered all the factors documented above, including the risks and uncertainties in the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, and that reflects current management practices as well as the socio-economic objectives of the Crown can be best achieved in the Merritt TSA by establishing an AAC of 1 508 050 cubic metres. This AAC excludes 8700 cubic metres issued to woodlot licences since the previous determination, and includes an increase of 62 500 cubic metre in the smallwood partition relative to the current AAC. This creates a total smallwood partition applicable to the smallwood land base of 312 500 cubic metres per year.

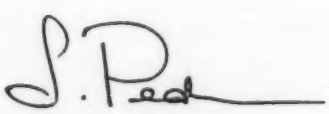
This determination is effective January 1, 2002, and will remain in effect until a new AAC is determined, which must take place within five years of the date of this determination. If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability of staff to undertake these projects is dependent on available staff resource time and funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Merritt TSA. I recommend that district staff:

- Continue to develop terrain mapping for the district and monitor harvest operations in relation to the operability classification.
- Monitor management in ESA2s to confirm appropriate accounting of these areas in future timber supply analyses.
- Continue to monitor and track smallwood operations and trends, and clarify definition and administration of these stands.
- Continue to monitor performance in selection management Douglas-fir stands to assess their contribution to timber supply in future determinations. Investigate management options, including more intensive management, and the potential for restoration of productivity in these stands.

- Monitor management in all Douglas-fir stands to improve information on the degree to which this species should form part of the timber harvesting land base. Investigate the extent to which Douglas-fir retained after harvest in fir-pine mixes should contribute as wildlife trees.
- Monitor the characteristics of partly harvested forest cover polygons to improve information on species composition and assess the importance of possible volume reductions.
- Continue to monitor mechanical falling to ensure average stump heights meet the utilization levels (approximately 15 centimetres) assumed in my determination.
- Collect local data to improve confidence about the magnitude of site productivity adjustments appropriate for the Merritt TSA.
- Improve local knowledge with respect to small stocking gaps and other stand-level limits to productivity that are represented by OAF1s in managed stand yield estimation. This is a province-wide issue, however, local information is required to improve information;
- Develop a comprehensive stream classification inventory and clarify riparian management.
- Clarify the objectives and management regime for visual resources and work towards establishing VQOs for the entire TSA; collect improved visual inventory information; and document the role of selection harvesting in achieving visual management objectives.
- Continue with the collection of data for identified wildlife species, ungulate winter range, elk movement corridors and grizzly bears.
- Assess and define management requirements in community watersheds in more detail to improve information available for the next determination.
- Continue to monitor unsalvaged loss estimates so that future determinations can account for any losses that may result over time due to the relative abundance of older forest subject to frequent disturbance.



Larry Pedersen
Chief Forester
October 4, 2001

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the Forest Act, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silvicultural treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

   (a) encourage maximum productivity of the forest and range resources in British Columbia;
   (b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;
   (c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;
   (d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and
   (e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

Appendix 5: Summary of Public Input

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of British Columbia
Minister of Forests
Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests
OFFICE OF THE MINISTER

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests

Merritt Timber Supply Area
Timber Supply Review

Summary of Public Input

BC Ministry of Forests
Merritt Forest District
PO Box 4400, Stn. Main
Highway 5A & Airport Rd.
Merritt, BC
V1K 1B8

October 4, 2001

This is a summary of the public input received on the Timber Supply Review in the Merritt Timber Supply Area. This summary does not assess the feasibility or validity of the input or whether it relates to the clearly defined mandate of the chief forester in the allowable annual cut determination.

Merritt Timber Supply Area

Background

As part of the review of timber supply in the Merritt Timber Supply Area (TSA), two opportunities were provided for public input. The first followed release of the Merritt Timber Supply Area *Data Package* and the *Information Report* in September 1999. The *Information Report* was a non-technical summary of the draft data and management assumptions that were to be applied in reviewing the timber supply for the Merritt TSA. A 30-day review period, ending October 12, 1999, was provided for the public to comment on these documents.

On March 8, 2001, the British Columbia Forest Service released the *2001 Merritt Timber Supply Area Analysis Report* and the *Public Discussion Paper*. The public was encouraged to review and comment on the accuracy of the information in these documents and to provide additional information during the 60-day review period that ended May 7, 2001.

This report summarizes the input received during both public review periods. This information was provided to the chief forester for his consideration when he reviewed the allowable annual cut (AAC) for the Merritt TSA. The first section of this summary outlines the public review process implemented by the Forest Service, and describes the types of public input received. The second section summarizes the public input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the *Freedom of Information and Protection of Privacy Act*) can be reviewed at the Merritt Forest District office.

Public Review Process and Response

Merritt District staff actively solicited public input on the Timber Supply Review in the Merritt TSA through the following actions:

- approximately 60 copies of the *Information Report, Data Package and Analysis Report* were mailed to stakeholders in the TSA, such as First Nations, licensees and local governments. Meetings or presentations were offered.
- the *Data Package and Analysis Report* were available at the district office in Merritt and the regional office in Kamloops; approximately 23 were picked up.
- newspaper advertisements were placed, advising of the availability of all documents for review by the public.
- copies of all the documents were made available to the local media. Interviews were conducted with both radio and newspaper.
- open houses on the *Data Package* were held in Merritt and Princeton during September, 1999.
- open houses on the *Analysis Report* were held in Merritt on March 28, 2001 (participants) and in Princeton on March 29, 2001 (22 participants).
- presentations on the *Analysis Report* were made to the Merritt TSA Planning Committee, Merritt City Council, Princeton Town Council, Nicola Tribal Association and the Upper Similkameen Band during March and April, 2001.

The Merritt Forest District received two written submissions on the *Data Package* and five submissions on the *Analysis Report* (see Appendix 1).

Merritt Timber Supply Area

Public Input

In this section, public input on the information presented in the Timber Supply Review documents for the Merritt TSA is summarized under the following headings:

- Data Package (and Information Report)
- Timber Supply Area Analysis Report (and Public Discussion Paper)
- Other comments.

Data Package

Land Base Factors

The submission from the Ministry of Environment, Lands and Parks (MELP) expresses support for the use of operability lines given the dependence of biodiversity protection on inoperable sites but asks how this will be tracked in future forest planning.

MELP says they are pleased to see recognition of the significant road developments in this TSA and hope that licensee concerns with the netdowns for roads, trails and landings can be addressed in the future through road rehabilitation planning.

The joint submission from the licensees questions the definitions used for problem forest types. In particular, the licensees say Douglas-fir stands shorter than 19.5 metres are not being harvested and should be defined as problem forest types.

MELP says potential protected areas should be excluded from harvesting for a sensitivity analysis since these areas are currently avoided. The licensees say potential protected areas should not be considered in this timber supply analysis, as the impacts of these areas are considered when they are legally established.

The licensees express concern about double-counting in environmentally sensitive areas (ESAs). For example, they say recreation ESAs within lakeshore riparian management zones, wildlife ESAs within ungulate winter range areas, and water ESAs within community watersheds should not be netted out of the land base.

Volume Estimates and Rate of Growth

MELP says they support modelling the exclusion of Douglas-fir volumes in mixed species stands. The agency says measures to protect old growth, watersheds and biodiversity all employ fir retention strategies to various degrees and it is critical that this be modelled in the timber supply analysis.

The licensees say the 15 m^3/hectare volume exclusion for Douglas-fir estimates historic retention levels. They say this is no longer current practice and should be not be included in the analysis. According to the licensees, the current policy is to retain five of the largest trees with wildlife attributes per hectare, which are to be considered as wildlife trees.

The licensees note that the minimum harvestable age is based on the age at which a stand achieves a merchantable volume (150 m^3/hectare) and district cutting priorities have nothing to do with setting this age.

Silviculture and Regeneration

The licensees maintain that dry-belt Douglas-fir is almost entirely harvested by a selection method, and this should be modelled in the analysis. The use of small patch systems should not be modelled.

The licensees say the current experience of two smallwood licensees is that establishment density for these types is 1000-1300 stems/hectare and this figure should be used in the analysis.

Biodiversity

The licensees note that landscape-level biodiversity requirements are not being applied as current practice but are being included in the base case on the direction of the chief forester.

The licensees say that wildlife tree patches (WTPs) should be modelled as area netdowns, rather than volume reductions. They say the estimate of 10.7% of the cutblock in WTPs appears high based on current practice and the fact that some WTPs are located outside the timber harvesting land base or in other constrained areas (e.g., riparian reserves).

Visual Quality

The licensees say that only areas formally designated by the district manager as scenic areas with established visual quality objectives should be considered in the analysis. They note the forest cover requirements for visually sensitive areas appear to reflect future trends but not current practice.

Riparian Management

MELP expresses support for the measures to protect riparian areas, particularly the model developed for wetland buffers. They note the importance of these buffers (even if not required by the Forest Practices Code), particularly for the management of moose. The agency says the timber supply analysis should reflect that many smaller wetlands occur as part of complexes that do have Code buffers and it is current practice to retain buffers.

The licensees' submission raises a number of issues with regard to riparian area management. These include:

- the assumptions for small streams and for wetlands do not reflect current practice.
- the licensees are unsure if the stream classification system from the sample watershed is thorough enough to distinguish fish-bearing from non-fish-bearing small streams. Current practice is to classify all affected streams based on a fish inventory prior to finalizing harvesting plans.
- the retention levels for lakes imply these are permanently reserved, which is inconsistent with visual quality management and the *Kamloops Region Lakeshore Management Guidebook*.

Elk Corridors

The licensees say they are not aware of any policy definition of Elk Movement Corridors and the forest cover requirements associated with them should be eliminated from the analysis.

Timber Supply Area Analysis Report

Land Base Factors

The submission from the director of the Shuswap Environmental Action Society (SEAS) says he assumes that previously designated inoperable areas have been included into the operable land base for this analysis. The submission says the analysis does not account for the extraordinary measures required to meet requirements for riparian areas, wildlife trees or slope stability in these areas with poor quality wood and/or very steep slopes.

The licensees' joint submission says that just because problem forest type stands have a silviculture label assigned to them, that does not mean they should be considered available for future harvesting. This should only occur when there is a rehabilitation program in place or surveys show the current forest cover will yield a merchantable crop, according to the licensees.

Grizzly Bears

The licensees note the draft grizzly bear recovery plan has not been approved and should not be considered in the timber supply analysis.

Riparian Area Management

The Department of Fisheries and Oceans (DFO) expresses concern that the netdown for riparian areas is insufficient. The agency says DFO and MELP have identified the need for increased riparian retention within the Nicola River watershed. The submission notes that a 1998 strategic review of fisheries resources in the Thompson/Nicola drainages identified high values and the need to manage watersheds for hydrological stability through maintenance of water quantity and quality and riparian protection.

DFO says recommendations were made to the deputy minister of forests for interim standards for small streams that are directly tributary to fish-bearing streams. DFO also notes that streams in the Nicola River watershed have been declared temperature-sensitive and licensees were requested in January 2000 to manage for shade on fish-bearing streams in that watershed.

The licensees say the estimate of reserve/management zones for streams should be a priority for measurement before the next Timber Supply Review.

Stand Level Biodiversity

The MELP submission questions the reduction in the area retention levels for WTPs based on expected landscape unit objectives. The submission says since Old Growth Management Areas are still being developed, they are not current practice, and this reduction is not appropriate until they are finalized. As well, MELP says it is their experience that almost no individual trees are retained as wildlife trees, contrary to the assumption made in the *Analysis Report.*

The licensees maintain that the starting estimate of 10.7% average retention per cutblock for WTPs is high, particularly when current subzone targets are considered.

The MELP submission asks the chief forester to consider an amount of wood to be assigned for coarse wood debris (CWD), and suggests 10 m^3/hectare. The agency says there must be some sound wood to meet CWD requirements; retaining only wood so rotten it cannot be milled is not sufficient. The submission also identifies a need to get around the circular argument that the Timber Supply Review only models current practice and current practice cannot be changed because it was not modelled in the Timber Supply Review.

Landscape Level Biodiversity

The licensees say the assumption that all stands outside the timber harvesting land base (non-THLB stands) continue to age with no disturbance impacts is not valid, or current stands would be 10,000 years old. They suggest a more realistic alternative to modelling the impact of 400 hectares of disturbance in the non-THLB annually would be to assume that the current age class distribution represents the expected distribution over time, and run a sensitivity analysis on this basis.

In its submission, MELP questions whether the chief forester intended to delay meeting old-growth retention requirements until the third rotation only if there was a demonstrated impact on timber supply, rather than as a default.

The SEAS submission notes potential problems in present and future stands (e.g., long range forecasts for losses from fire and insect damage) that should be factored into the maximum allowable disturbance levels. With regard to recruiting old growth to meet retention requirements, the society says this should not take place solely outside the THLB first since the same forest disasters occur in and outside the THLB. This submission also says the age class profile should not be allowed to drop off so dramatically after 100 to 150 years for the same reason (future uncertainty about potential losses).

Merritt Timber Supply Area

Forest-to-Grassland Reversion

The licensees say that since there are no defined objectives or programs for grassland expansion, this is not current management and should not be part of this timber supply analysis.

Harvest Sequence

The MELP submission notes a significant planning challenge that results from major licensees targeting smallwood stands as leave areas, while smallwood operators target parts of the normal forest for leave areas. The agency says there is potentially an availability problem for both types of operations.

Other Comments

Several submissions comment on factors or issues other than those specifically covered by Timber Supply Review documents. These comments are summarized in this section.

Timber Supply Review Process

Three submissions comment on the Timber Supply Review process.

MELP says they would like to reach an agreement to ensure the sensitivity analyses they requested are done, and that changes proposed to the *Data Package* are made available to MELP.

The licensees note an error in the socio-economic analysis section. The statement that Riverside is "partially owned by Tolko Industries" is not correct, according to the licensees, who also say ownership is not relevant and should not be included.

The SEAS makes a number of comments, including:

- the *Analysis Report* is very technical, making it difficult for a layperson to understand or have their suggestions taken seriously.
- requests for increased biodiversity protection are ignored because data does not meet the standards of the Forest Service.
- greater emphasis must be placed on ecosystem changes in doing sensitivity analyses, and perhaps an independent body should do these.
- there is too much reliance on unproven innovative forest practices.
- individuals should be named in the *Summary of Public Input* as well as companies and organizations.
- full submissions should be presented to the chief forester, not summaries.

Harvest Levels

The City of Merritt requests an increase in the AAC or, if that is not possible, at least continuation of the current level. Forestry is a major component of the economic life of this community, according to the City's submission.

The SEAS says implementation of the Forest Practices Code should have reduced the AAC, and they suspect this has been compensated for by including previously inoperable areas. The society says the proposed softwood lumber tariff may require a review of every AAC in the province, and a reduction may be necessary to prevent companies from being penalized for undercutting. This emphasizes the failing of a volume-based industry, according to the SEAS submission.

Appendix 1

Submissions received by the Merritt Forest District

Submissions received on the Data Package

Forest industry

Joint submission from Ardew Wood Products, Aspen Planers, Tolko Industries and Weyerhaeuser Canada

Government agency

Ministry of Environment, Lands and Parks; Alison Chutter, Forest Ecosystem Specialist

Submissions received on the Timber Supply Analysis Report

Forest industry

Joint submission from Ardew Wood Products, Aspen Planers, Riverside Forest Products, Tolko Industries and Weyerhaeuser Canada

Local government

City of Merritt

Interest groups

Shuswap Environmental Action Society; Bert Parke, director

Government agencies

Department of Fisheries and Oceans – Habitat Enhancement Branch; Gordon Kosakoski

Ministry of Environment, Lands and Parks; Brian Harris, Forest Ecosystem Specialist